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—

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St. Mary's Hospital
London County Council
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Crown Agents
King's College Hospital
Guy's Hospital
Etc.

As used by
Hampstead General Hospital
Berkeley Hospital, Glos.
Bootle General Hospital, Liverpool
Frenchay Park Sanatorium, Bristol
Ongar and District Hospital
British Red Cross Society (Rheumatic Clinics)
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St. John's Hospital, Twickenham
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A REVIEW

INFRA-RED RADIATION

by

F. W. READ, A.M.I.E.E., C.E.E.

LIFE MEMBER BRITISH INSTITUTE OF RADIOLOGY

INFRA-RED RAYS—WHAT ARE THEY?

IN common language we understand by the expression INFRA-RED RAYS, rays that cannot be seen. In more scientific terms we should say a radiation having a wave-length between 8,000 and 1,000,000 Angstrom units, and therefore invisible to the human eye. **What therapeutic value have these invisible rays?** First, they have a penetrative power which has been proved to penetrate the human hand and produce a photographic impression of the bones of the hand. The absorption of these rays has a very marked medical value which is testified to by Prof. Sir Leonard Hill, Dr. Annandale Troup, Dr. Murray Levick, Dr. C. J. Cemach, Dr. George Starr White, Dr. Austin Furniss, Sir William Willcox, etc., and Infra-Red Ray treatment has now definitely taken its place amongst the accepted radiation treatments, and is found in almost every Hospital department.

What are the effects of Infra-Red Radiation on human tissues? They immediately produce vaso-dilation of the blood vessels, hyperaemia and heat are produced. The whole area treated becomes deeply reddened and engorged with an intensive blood flushing, thereby accelerating nutritious processes and mechanically flushing away by the blood infusion waste products which may be the cause of so much trouble.

The best results from Infra-Red Radiation are obtained by the treatment of a relatively localized area, and treatment over large areas is to be avoided. In this respect it is quite contrary to the ideals of Ultra-Violet light treatment.

Powerful influences are to be traced in the subcutaneous tissues, the blood and lymph vessels, and other tissues including nerves and nerve endings, and a relief of pain is one of the more obvious effects of this form of treatment.

Benoit claims that Infra-Red Rays have the power to increase the red corpuscles of the blood by 15 to 25 per cent after a short series of treatments. The same agent also lessens the white corpuscles and is useful in the treatment of leukæmias, particularly those of the splenic type.

The condition most frequently treated by Infra-Red Rays is rheumatism in its many forms, and much clinical success for this treatment has been mentioned by the many medical contributions on this subject.

Infra-Red Rays are quite harmless in their effects and can be applied quite safely for long periods of treatment.

The penetrative power of Infra-Red Rays is very striking, because it has been found that photographs of objects which are quite invisible to the human eye can readily be obtained on a photographic plate which has been made sensitive to Infra-Red Rays.

Dr. Wright, of the Leek Observatory, in 1924, produced a photograph of the Sierra Nevada at a distance of 150 miles between camera and object.

More recently, Stevens has produced an aerial photograph from a height of 23,000 feet, showing Mount Shasta at a distance of no less than 331 miles between camera and object.

The penetration into human tissue is also very remarkable. Messrs. Ilford, Ltd., produced an experiment on depth penetration as follows. An electric lamp was placed on one side of the human hand; on the opposite side of the hand, a photographic plate sensitive to Infra-Red Rays was placed, and an exposure was made. When the plate was developed, an outline of the bones of the hand was seen, which is proof that the rays have a greater degree of penetration than any other form of ray therapy apart from X-Rays.

From this it will be seen that we have in Infra-Red Rays a very powerful therapeutic ally, and the profession have already embraced the advantages offered by this form of treatment, and as a result we find that the Duo-Ray Infra-Red Apparatus has been installed in the leading hospitals of the country, of which we would mention the London Hospital, London, E.; Guy's Hospital, London, S.E.; The Royal Free Hospital, Gray's Inn Road, London, W.C. 1; King's College Hospital; British Red Cross Society for their rheumatic Clinics, etc.

It has been proved by several authorities, that Infra-Red Rays play a most important rôle in our existence; for instance, Dr. George Starr White reports that he made an experiment on plant life. Seeds and flowering plants were planted in two rooms from which all visible light was excluded, one of these rooms was irradiated by the invisible Infra-Red Rays, the other was not so radiated. The result in the vegetable growth was most interesting as the seeds and plants sprouted and grew quite well, taking on all the colours of nature, in the room irradiated by Infra-Red Rays; but in the second control room only a few of the seeds sprouted, and the plants which grew at all were white and puny and soon withered.

It should be noted that the beneficial effects of Infra-Red Rays are not primarily due to the heat produced and propelled on to the patient, because experiments have been made using an electric fan to deliver

an air current between the patient and the Infra-Red Ray Generator which carries away all the heat before reaching the patient's skin, but the radiation itself goes forward and has produced quite satisfactory results. The value of heat rays, however, are quite definite, and it would not be politic to exclude these, but it must be noted that the value of the treatment is not entirely locked up in the heat effects.

The condition most frequently treated by Infra-Red Rays is undoubtedly rheumatism, and quite recently we manufactured for King's College Hospital a special apparatus for the treatment of no less than six patients simultaneously; but it must not be construed that its useful purpose is confined to rheumatism alone, as almost daily we find medical reports of successes in many other conditions, of which we mention the following, which is by no means exhaustive :

All Rheumatic Conditions, Lumbago, Sciatica, Neuritis, Painful Menstruation, Neuralgia, Relief of Pain in almost all painful conditions, Inflammatory Conditions, Tic Doloureux, Intercostal Neuralgia, Myalgia, Boils, Abscesses, Whitlows, Poliomyelitis anterior, Bell's (Facial) Paralysis, Sinusitis, Osteo-Arthritis, Rheumatoid Arthritis, Sprains, Laryngitis, Chilblains, Metatarsalgia, etc.

Dr. Austin Furniss, L.R.C.P., L.R.C.S., D.P.H., in an article in the British Journal of Physical Medicine states : " Radiant Heat is of great value in the treatment of many respiratory conditions such as bronchitis, pleurisy, and in the later stages of influenza."

An excellent textbook on this subject by Dr. W. Annandale Troup, M.C., M.D., Ch.B. (St. And.), with a foreword by Sir William Willcox, K.C.I.E., C.B., C.M.G., M.D., F.R.C.P., is published by the Actinic Press at 10s. 6d., and those interested in this subject should certainly obtain this treatise.

The best results are obtained with prolonged applications of thirty to forty minutes' duration, and no harm can result with even longer applications. The absorption of the radiation is associated with a sensation of the nerve endings, so that this effectively guards one against coming too close to the source of the radiation.

Many thousands of the Readson Duo-ray Infra-Red Ray Apparatus have now been supplied, the original of which was designed by Mr. F. W. Read, A.M.I.E.E., in 1932, following on valuable suggestions supplied by the Sister in Charge of the Electrical Department of the Hospital for Epilepsy and Paralysis, Maida Vale, to whom we offer our best thanks.

The prevalence of rheumatism in its many phases warrants the closest attention of those responsible for its treatment.

It is stated that the sick benefits provided by the Ministry of Health for rheumatic patients is far greater than any other condition, it costing the Ministry no less than £9,000,000 per annum.

Sir William Willcox, K.C.I.E., C.B., M.D., C.M.G., F.R.C.P., in a foreword to the textbook entitled, " The Therapeutic Uses of Infra-Red Rays," by Dr. W. Annandale Troup, M.C., M.D., Ch.B., published by the Actinic Press states :

> " Chronic rheumatic conditions are the commonest of ailments at the present day and they affect all classes from the highest to the lowest. For most of these conditions Infra-Red Irradiation is of the utmost value as Dr. Troup clearly shows. In addition many painful conditions such as neuralgias of various kinds, toothache, earache, post herpetic pains, etc., derive immediate benefit.
>
> " Infra Red Irradiation is not confined to medical complaints, but as Dr. Troup proves by his clinical records, surgical conditions such as sprains and long standing injuries derive very marked benefit from this form of treatment."

By the foregoing it will be seen that in Infra-Red Radiation we have an extremely potent therapeutic agent which is destined to play possibly the most important part in the treatment of rheumatism and many other conditions, and it must be understood that it is already of proven merit and has long passed far beyond the " Nine days' wonder " category.

The outstanding feature of the Duo-Ray apparatus is that it provides at a very economical price the advantages of both Infra-Red Applications and Luminous radiant heat applications, the instrument being fitted with alternative units for this purpose. In addition the apparatus can be used as a general examination lamp which is very useful to the physician ; it can also be used for the application of melted paraffin wax. Hitherto, considerable duplication of apparatus was necessary to obtain these effects ; they can now be had at a very nominal price.

Two Radiations are to be obtained from the apparatus—luminous radiant heat emanations from the luminous source, and Infra-Red emanations from the non-glowing source, so that the physician can select the radiations best suited to the case under treatment.

Hand or Stand Lamp. The design provides for the reflector in which the elements are housed being used either on the stand as seen in the illustration (page 15) or as a hand lamp (page 12), which is perhaps more convenient when the apparatus is to be used at the house of a patient, as this obviates the necessity of transporting the stand. The lamp is quite light and is easily supported in the hand—it weighs only 28 oz.

The Stand. The stand is fitted with a very ingenious cross arm which permits of a 2-ft. extension over the consulting room couch or bed. This is a very great advantage as it enables the hood to be placed vertically over the part under treatment. The cross arm is so designed that any tilting angle of the hood can be obtained. This is brought about by a universal turntable piece attached to the vertical upright.

This is made in bakelite which provides a firm grip without any abrasion of the metal work. Height adjustment is provided as the vertical stand is made telescopic.

The Reflector is designed to throw a parallel beam of radiation, and is made of solid aluminium, so that a bright surface can always be relied upon, electro-plating being avoided in this part of the apparatus.

Running Costs. Assuming that electrical energy costs 4d. per unit, the apparatus costs approximately $\frac{3}{4}$d. per hour to run, or something less than $\frac{1}{4}$d. for fifteen minutes' treatment.

The apparatus is entirely British made in the Readson Works, and complete service is available at all times.

Weight. The weight of the entire apparatus is 12 lb. The weight of the detachable portion, that is the handlamp with its insulating handle, is only 28 oz.

Conducting Cable. The conducting cable of this apparatus has had special attention, as we find in the past this has been a vulnerable point to the good working of such apparatus. We have, therefore, selected a heavy rubber covered cable, that will withstand the heaviest use without injury, and is unkinkable.

***Effects of Infra-Red Radiations.** A perusal of the textbooks on this subject will indicate that Infra-Red Radiations produce definite and marked analgesic effects which are brought about by :

1. Soothing effect on the nerve endings in the skin.
2. Increased blood supply resulting in the affected part.
3. Their anti-spasmodic effect.
4. Removal of exudates resulting from bruising and lacerated blood vessels.

These properties at once recommend the use of this apparatus for **painful conditions** where relief of pain is desired.

In addition, **Neuralgia** can be very quickly relieved often by one single application.

Inflammatory conditions show a very marked subsidence under Infra-Red radiations.

Excellent results can be obtained, also, in conditions that are very difficult to treat otherwise, for instance, in **tic doloureux.** Marked relief of pain is claimed in this condition.

* Vide "Therapeutic Uses of Infra-Red Rays," by W. Annandale Troup, M.C., M.D., Ch.B. Published at 10s. 6d. Third Edition. "Infra-Red Ray Therapy," by Cyril E. Michael, M.A., M.B., B.C. "British Journal of Physical Medicine," Vol. II, No. 3. July, 1936. "Infra-Red Irradiation," by W. Beaumont, M.R.C.S. (Eng.), L.R.C.P. (Lond.). Published at 6s. 6d. net.

Other painful conditions relieved by Infra-Red radiations are **Neuritis, intercostal neuralgia, sciatica, muscular rheumatism,** and **myalgia,** because of the increased blood supply brought about by the Infra-Red treatment. It is to be recommended in the treatment of **boils, abscesses,** and **whitlows,** which suppurate more rapidly under treatment and more readily heal. If treated early suppuration may be avoided.

An application of twenty minutes will always relieve, if not entirely cure a case of **lumbago.**

Infra-Red radiations are of marked use in diseases which cause muscular wasting, such as **poliomyelitis anterior** and **Bell's (facial) paralysis.** Operative measures can frequently be avoided in cases of **Sinusitis** by early application of Infra-Red radiations to the affected sinus.

Prolonged treatment is recommended in this condition, even up to one hour's duration.

Osteo-arthritis is benefited by the resolution of infiltrated area absorption of exudates and stimulation of the muscles.

Sprains. Acute sprains can be successfully treated by Infra-Red radiations, resulting in complete freedom of movement without pain in a few days.

Application of Infra-Red Rays with Melted Paraffin Wax. The Duo-Ray Infra-Red Lamp can be very conveniently used for this purpose and the expense of alternative apparatus avoided. Medicated Paraffin Wax is supplied in cartons containing two blocks (page 19).

This is scraped with a knife into fine flakes, which fall on to the affected part to be treated.

Many operators are called upon to apply paraffin wax baths from time to time to joint affections, which necessitates the installation of expensive and bulky apparatus, which is frequently found inconvenient when treating certain parts of the body, such as hip, lumbar region, etc. We are pleased to state that the Duo-Ray Apparatus can be successfully used for this purpose without entailing any expense whatever. If a block of paraffin wax is scraped by a knife the wax will be thrown up in thin flakes, and if these flakes are dropped on to the limb to be treated, and the Duo-Ray Apparatus with its Infra-Red ray generator projected on to the affected part, all the advantages of a paraffin wax bath treatment will be available and the absorption of the wax by the skin will be quite successfully brought about. The therapeutic value of paraffin wax bath treatment has been referred to by several medical authorities.*

* "The Medical Press," December 10, 1919. "Melted Paraffin Wax Bath," by F. Howard Humphris, M.D., F.R.C.P. Ed., D.M.R.E. Cantab.

Medicated wax of the correct melting point is supplied at 3s. per carton. List No. 510.

This method of application is very economical, inasmuch as only a fractional quantity of wax is required.

Application of Infra-Red Rays with Iodex. Iodex ointment may be massaged into the affected muscle or joint prior to irradiation with Infra-Red rays. The Infra-Red rays bring about a greater degree of absorption of the Iodine ; the presence of iodine in the saliva can be demonstrated within half an hour of the combined application. This form of application is particularly desirable in **rheumatic conditions.**

NEON-RAYS RIPEN WINTER STRAWBERRIES

" Mid-winter strawberries are the latest gift of science to the gourmet," writes the " News Chronicle " Agricultural Correspondent.

" Neon lamps, producing a red-orange light, induced strawberry plants in Holland to yield fruit on January 30th.

" Dr. J. W. Roodenburg describes the experiment in the Journal of the Royal Horticultural Society.

" Two sets of twenty-four plants were used, one irradiated, the other given no artificial light. From October 7th the light was applied for eight hours each night, and heating began on October 14th, when the temperature fell to 46° F.

THE CROP

" By the first week in December the twenty-four neon plants produced 197 open flowers, compared with fourteen in the control set.

" The plants were then given a concentrated fertilizer, and the first fruits were gathered on January 30th.

" *By February 14th the yield was seventy fruits against only one from the un-irradiated. Gathering finished on March 13th, when the total weight of irradiated fruit was over forty times that of the other.*

" When the fruit was sold on the market it realized double its production cost."

INFRA-RED RAYS

AN ELECTRONIC ASPECT

The curative value of the several radiations most in common medical use, e.g. Infra-Red Radiation, Radiant Heat radiation, Ultra-Violet Light Radiations (artificial sunshine) Röntgen Rays (X-rays), all have a common basis, that is, they are all electrically produced, and it may well be that the future will see a leaning towards an Electric Ionic discharge understanding rather than the emission of light or heat, as such.

It is common knowledge that Professor Fleming's great discovery of electronic emission that led up to the making of the radio valve (wireless) and the modern method of producing X-rays, was the recognition of the causes as to why an ordinary electric light bulb became discoloured on its inner walls after use. In this case Professor Fleming determined that particles of carbon were torn away by an electron emission from the incandescent lamp filament. Following quickly on this important observation the first wireless valve was constructed by Signor Marconi and so popular wireless telegraphy and telephony were born. It is perhaps strange that the underlying principles of this great discovery that has played such an important part in wireless, X-rays, and electrical rectification, has been so sadly overlooked by our medical investigators. Surely, the long distance photographs of 300 and more miles between camera and object give colour to the electrical ionic theory rather than an understanding in terms of light or heat. Photographs have been produced without any visible light, through substances quite opaque to ordinary light, through dense fogs.

Reflection on these points it is hoped will help to explain the real cause of the therapeutic effects of the radiations and stimulate our efforts for ever increasing their efficiency and furthering the advance of physical therapy in the treatment of the various bodily ailments.

It is worthy of note that radium is also in a constant state of electronic emission and that these emissions are also in common use for the treatment of malignant and pathological conditions.

Infra-Red Rays are invisible to the human eye and are therefore not spectacular, but it will be remembered that when Michael Faraday first demonstrated his apparatus to prove the power of electrical induction at a meeting of the Royal Society (probably the most valuable discovery the world has ever known) a lady visitor remarked, " Oh, yes, I see it but what is the good of it ? " To that Faraday replied, " Madam, I ask you what is the use of a new-born baby ? "

Infra-Red Radiation is not a new-born baby, we have had it for all time in the form of natural sunshine, but only of recent years have we recognized the curative value of that part of light known as the Infra-Red Region of the Solar Spectrum.

The further study of Infra-Red Radiation is an open field with prolific medical possibilities, and it is hoped that investigators will contribute their experiences, elementary or otherwise, as only by this means can complete understanding be collated. Here is an investigation where the Physician, Physicist, Electrician, and Patient can all help by contributing their experiences in a very worth-while subject.

TESTIMONY

Lord HORDER, K.C.V.O., in a foreword to the textbook, " Infra-Red Irradiation," by Dr. W. Beaumont, M.R.C.S. (Eng.), L.R.C.P. (Lond.), states :

" . . . Dr. Beaumont introduces an apology on the subject of the treatment of symptoms rather than of the disease of which the symptoms are an expression. Since the symptoms (par excellence) for which Infra-Red Irradiation is used is pain, ' the worst of ills,' such apology is scarcely necessary. Indeed, the author feels this to be so. The relief of pain is, after all, the doctor's main function after the function of preserving life, and if medicine cannot achieve this, it stands condemned. . . . '

Sir WILLIAM WILLCOX, K.C.I.E., C.B., C.M.B., M.D., F.R.C.P. (Lond.), states in a foreword to the textbook by Dr. Annandale Troup, M.C., M.D., Ch.B. (St. Andrews), entitled " Therapeutic Uses of Red Rays " : " . . . The value of irradiation as a powerful and valuable therapeutic agent has been fully established by the great amount of experimental and therapeutic work which has been carried out during recent years. . . . Chronic rheumatic conditions are the commonest of ailments at the present day, and they affect all classes from the highest to the lowest. For most of these conditions Infra-Red irradiation is of the utmost value, as Dr. Troup clearly shows."

Dr. W. ANNANDALE TROUP, M.C., M.D., Ch.B. (St. Andrews), in a preface to his book, the " Therapeutic Uses of Infra-Red Rays," states in a concluding paragraph :

" In my considered judgment, no practitioner can afford to neglect Infra-Red therapy. He will at least find it a great adjunct to treatment in a wide variety of cases."

Dr. G. MURRAY LEVICK, L.R.C.P. (Lond.), M.R.C.S. (Eng.), states in an article entitled " The Therapeutic Value of Red Rays," and published in " The British Journal of Radiology," as far back as May, 1926 :

" It is my purpose to bring to your notice recently obtained evidence showing the extreme importance of red light as a physiological and curative agent. . . .

" Time does not allow me to give you an account of the many and diverse cases treated by red rays with good results. The evidence goes to show that these rays produce in the deep tissues an increased power of resistance and repair, and an improved nutrition when this is deficient. A remark that I have already made, that cloudy conditions absorb red rays, appears to me of great significance as it seems possible that this may have some bearing on many of these cases. Pus is opaque to red rays, and so in an abscess, must get heated more than the surrounding tissues. I would specially recommend the use of the red rays in the treatment of Lupus ; I have a case of long standing under treatment at the present moment that has yielded very rapidly, in fact, with unusual rapidity, and I would strongly advocate a thorough trial being made with these rays as an addition by all those who are treating lupus by general light radiation."

Dr. C. E. MICHAEL, M.A., M.B., B.C., in an article appearing in the " British Journal of Physical Medicine," Vol. II, No. 3, July, 1936, states :

" . . . A critical analysis of over two thousand treatments administered to some two hundred and fifty cases during the last four years, not counting a certain number of skin cases nor those in which ultra-violet lamps alone have been used. shows that in approximately 80 per cent, Infra-Red Rays alone were used ; in 12 per cent ultra-violet rays were used in conjunction ; and in 7 per cent a certain amount of massage was added.

" The results show that 14 per cent have obtained complete relief or cure in from one to three treatments ; 33 per cent in from four to six treatments ; and a further 33 per cent have been entirely satisfactory, but after longer periods. The residual 20 per cent of these cases classified as inconclusive or unsatisfactory, included cases of cancer, definite or suspected, paralysis, agitans, diabetes, many ' rheumatics' of long standing who did not give the treatment a fair trial, and a number with that kind of temperament which neither gets nor gives satisfaction from any kind of treatment."

The article goes on to relate the author's experience in the treatment of painful conditions, arthritis, fibrositis, myositis, inflammatory conditions; vaso-motor disturbances, neuritis, etc.

A. G. M., Hampstead, N.W. 3. 9273
" . . . After many years in private practice I have found that the Duo-Ray Infra-Red Ray Lamp is the most useful and efficient apparatus in my establishment, and one which gives most excellent result, in such cases as Neuritis, Fibrositis, etc. I should be obliged if you will let me have two more lamps at your earliest convenience."

W. McA., Paisley. 9274
" . . . Enclosed cheque in payment of Standard model Duo-Ray Lamp. Splendid apparatus. Have got results in one week. Please forward me another one, Model 502. Will be pleased to give you further results later."

E. G., London, W. 14. 9275
" . . . Enclosed cheque for Duo-Ray apparatus. I find the treatment most comforting for my broken arm."

R. V. H., Bognor Regis. 9276
" . . . I always praise my lamp to all my patients, and it has also increased my work, for which I am most grateful."

R. V. H., Bognor Regis (later). 9277
" . . . The apparatus is working beautifully and is nearly always hailed as a good friend."

E. H. P., London, S.W. 19. 9278
" . . . Your apparatus has done my rheumatism good—about 50 per cent; I use it night and morning."
NOTE.—*This communication was received four days after delivery of the Duo-Ray apparatus.*

M. M. C., Bridgwater. 9279
" . . . My son and I have received much benefit from the lamp you supplied to me, also two others who have used it. I shall certainly recommend it, and have already done so."

F. N. C., Harpenden. 9280
" . . . We have found the Duo-Ray Infra-Red Ray Lamp with which you supplied us most satisfactory in the treatment of rheumatism and an almost instant cure for chilblains. . . . I much appreciate your prompt services and will certainly recommend you whenever opportunity arises."

E. L., Bolton. 9281
" . . . Enclosed is a cheque in payment of the Duo-Ray Apparatus which I find extremely satisfactory and convenient."

W. H. M., Sheffield. 9282
" . . . I have received the Duo-Ray apparatus with which I am highly satisfied, hoping you will forward any future catalogues."

J. E., Falmouth. 9283
" . . . Duo-Ray apparatus has been working quite satisfactorily ever since and enabled me to give myself treatment as I was almost crippled with lumbago. I made an excellent and speedy recovery."

C. J. S., Lanarkshire. 9284
" . . . I find the Duo-Ray Infra-Red Ray apparatus that I purchased from you when in Birmingham so good that I would like you to send me another. . . . The wave-length of this lamp gives excellent results."

H. W., Bradford. 9285
" . . . You will be pleased to hear that the lamp has been of great benefit up to date."

J. W. K., Brighton. 9286
" . . . Enclosed cheque in payment of Duo-Ray apparatus and have pleasure in stating that it has already given satisfaction and relief to several patients. Hoping to be of some further service to you in the near future."

The London Hospital, E. 1. 9287

"Please supply No. 500 Duo-Ray Infra-Red Ray apparatus, and deliver as soon as possible." SURVEYOR.

NOTE.—*This indent is of importance as it is a repeat order following the installation of this apparatus at the Hospital twelve months before.*

The Admiralty, 9288
The Royal Victoria Yard, Deptford.

". . . You are requested to deliver into store at this Dockyard the following work agreeably to your tender of . The supply of work is subject to the approval of the receiving officer and the conditions of contract.

"—— Duo-Ray Lamps, as soon as possible."

P. J. W., Newark, Notts. 9289

". . . The lamp has given me wonderful success and I am more than pleased with it."

R. E. G., Derby. 9290

". . . I am very pleased with the Hand-lamp you supplied to me recently, and would be glad if you will send another to one of my clinics. . . ."

G. B. H., Grimsby. 9291

". . . Many thanks for your Duo-Ray Lamp which arrived perfectly, and having tested it, it is all and more than you claim for it."

M. H., Southgate, N. 14. 9292

"Ever so many thanks for sending your Duo-Ray apparatus to Mr. —— and I have pleasure in enclosing my cheque in settlement. It is very pleasing to hear from Mr. —— that the benefit he has received is marvellous, and to any one suffering from a similar complaint (Rheumatism). I know he can highly recommend your appliance. Again thanking you for all you have done, not forgetting the very prompt attention."

W. J. B., London, W. 3. 9293

"I am forwarding to you with very great pleasure my cheque for one Duo-Ray apparatus with fittings and I am thankful to say that my wife already reports that she has received benefit. This I truly believe will be cumulative and so will also be our indebtedness to you. With many good wishes for your success."

A. G., Morecambe. 9294

"I should like to add my testimony to the merits of your Duo-Ray apparatus. I have constantly used this apparatus and have found it of very great value especially in cases such as strains, sprains, atrophy of the muscles, and all joint affections. More particularly I have found it of immense assistance during the last few weeks. My wife had the misfortune to fracture two ribs and after the first three treatments the condition became so much easier as to permit massage freely and after twelve applications all movements became more normal and all pain has completely gone. You are at liberty to publish this brief appreciation if you wish."

THE DUO-RAY APPARATUS HAS BEEN SELECTED FOR THE USE OF ENGLAND'S LARGEST HOSPITALS

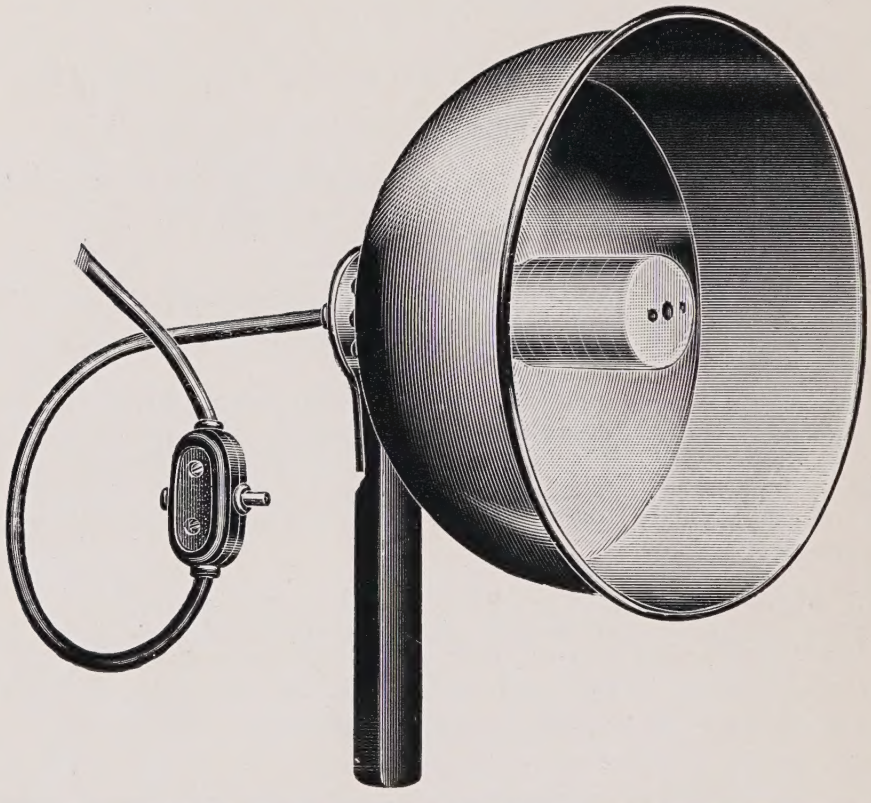
THE LONDON HOSPITAL
KING'S COLLEGE HOSPITAL
GUY'S HOSPITAL
ROYAL VICTORIA HOSPITAL, BELFAST
BOOTLE GENERAL HOSPITAL
NORTH-EASTERN HOSPITAL, TOTTENHAM
ST. JOHN'S HOSPITAL, TWICKENHAM
ROYAL MILITARY ACADEMY, WOOLWICH
LONDON COUNTY COUNCIL
ROYAL FREE HOSPITAL
HAMPSTEAD GENERAL HOSPITAL
ST. MARY'S HOSPITAL
DISTRICT HOSPITAL, SHEPTON MALLET
ONGAR DISTRICT HOSPITAL
FRENCHAY PARK SANATORIUM
BRITISH RED CROSS SOCIETY (Rheumatic Clinics)
BERKELEY HOSPITAL, GLOUCESTER

ADMIRALTY WAR OFFICE CROWN AGENTS
ETC., ETC

DUO-RAY HAND LAMP

SPECIAL NOTICE

The whole series of Duo-Ray Infra-Red Ray Apparatus seen in this Catalogue are entirely British made. It therefore follows that no part of the purchase price is represented by foreign importation tax.



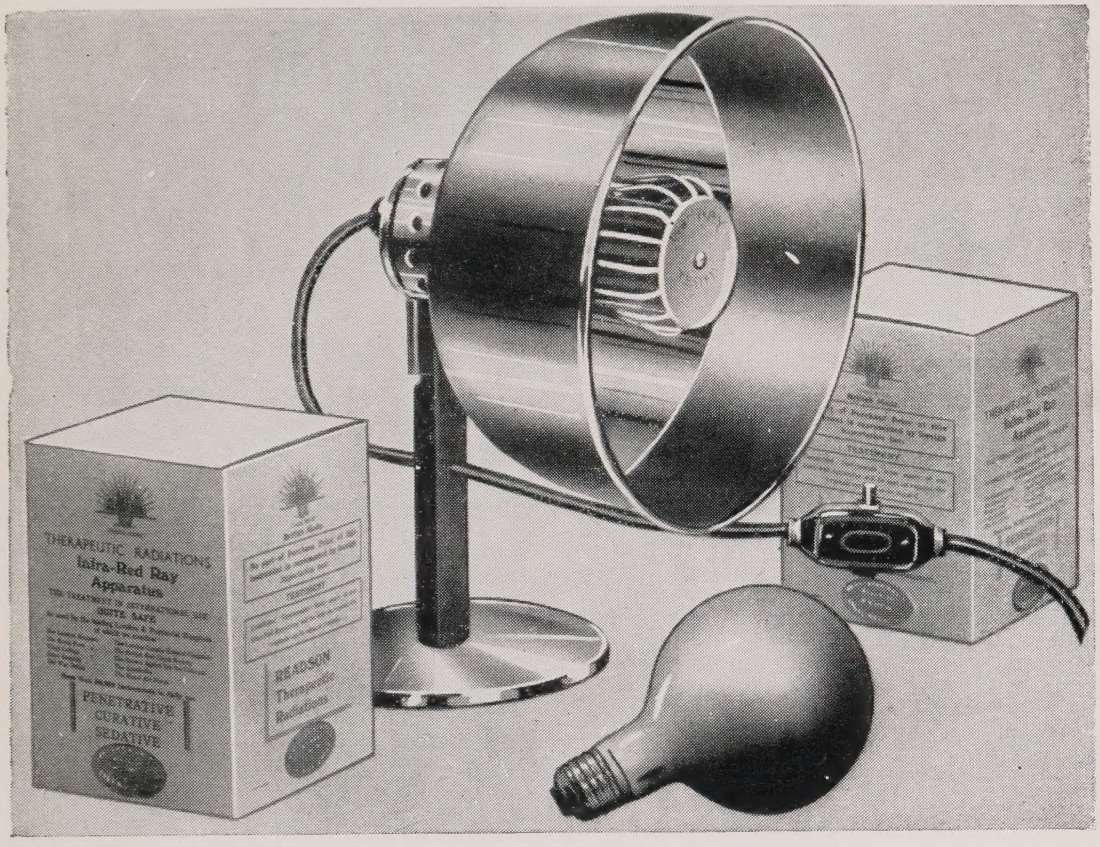
No.	COMPRISING	PRICE
502	" Readson " Duo-Ray Hand Lamp (without Universal Stand), but inclusive of Black Body Infra-Red Ray Generator, Luminous Radiation Bulb, Rubber-covered Connecting Cable, Plug or Lamp Socket Connector	**£3 3 3**
503	" Readson " Apparatus as above, fitted with Black Body Infra-Red Ray Generator only.	**£2 12 3**
504	" Readson " apparatus as above, but fitted with luminous radiation bulb only	**£2 9 6**

Please state Voltage of your electrical supply

Instructions for use, see page 20

DUO-RAY HAND LAMP

ON SIMPLE TABLE STAND



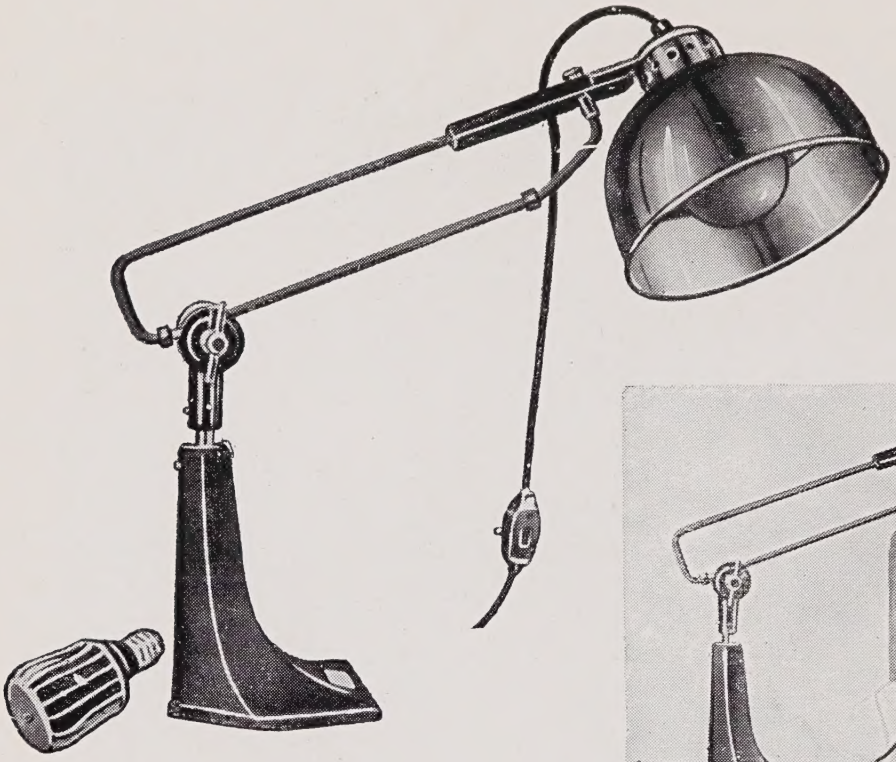
No.	COMPRISING	PRICE
501	"Readson" Duo-Ray Hand Lamp with **nickel-plated non-adjustable metal table stand,** inclusive of both Black Body Infra-Red Ray Generator and luminous radiation Lamp, rubber-covered connecting cable plug or lamp socket connector	**£3 9 6**
505	Ditto Apparatus, but with Black Body Infra-Red Generator only	**£2 18 3**
507	Ditto Apparatus, but with Luminous Radiation Lamp only	**£2 15 6**

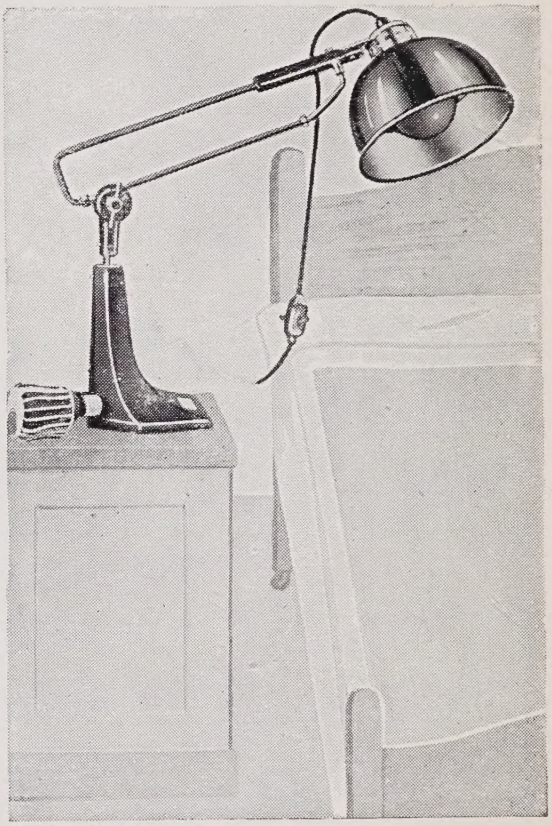
Please state voltage of your electrical supply

For instructions for use, see page 20

DUO-RAY APPARATUS

BEDSIDE MODEL ON ADJUSTABLE TABLE STAND





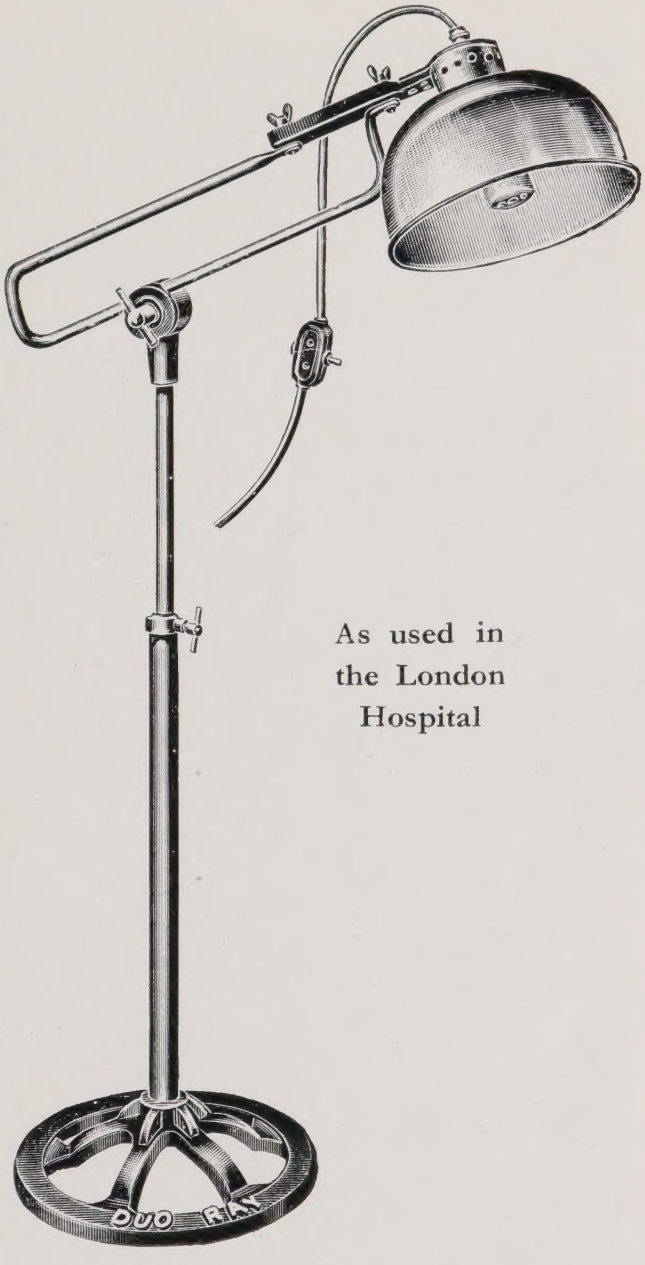
No.	COMPRISING	PRICE
512	"Readson" Duo-Ray Apparatus, Bedside Model with adjustable Table Stand permitting of universal movement of the reflector to any position desired. The lamp is detachable from the stand and can be used as a hand lamp when required. Complete with both Black Body Infra-Red Ray Generator and Luminous Radiation Lamp, rubber-covered connecting cable, plug or lamp socket adaptor	**£4 13 6**
514	Ditto, Apparatus, but with Black Body Infra-Red Ray Generator only	**£4 2 6**
516	Ditto Apparatus, but with Luminous Radiation Lamp only	**£3 19 9**

Please state Voltage of your electrical supply

For instructions for use, see page 20

DUO-RAY APPARATUS

STANDARD MODEL



As used in the London Hospital

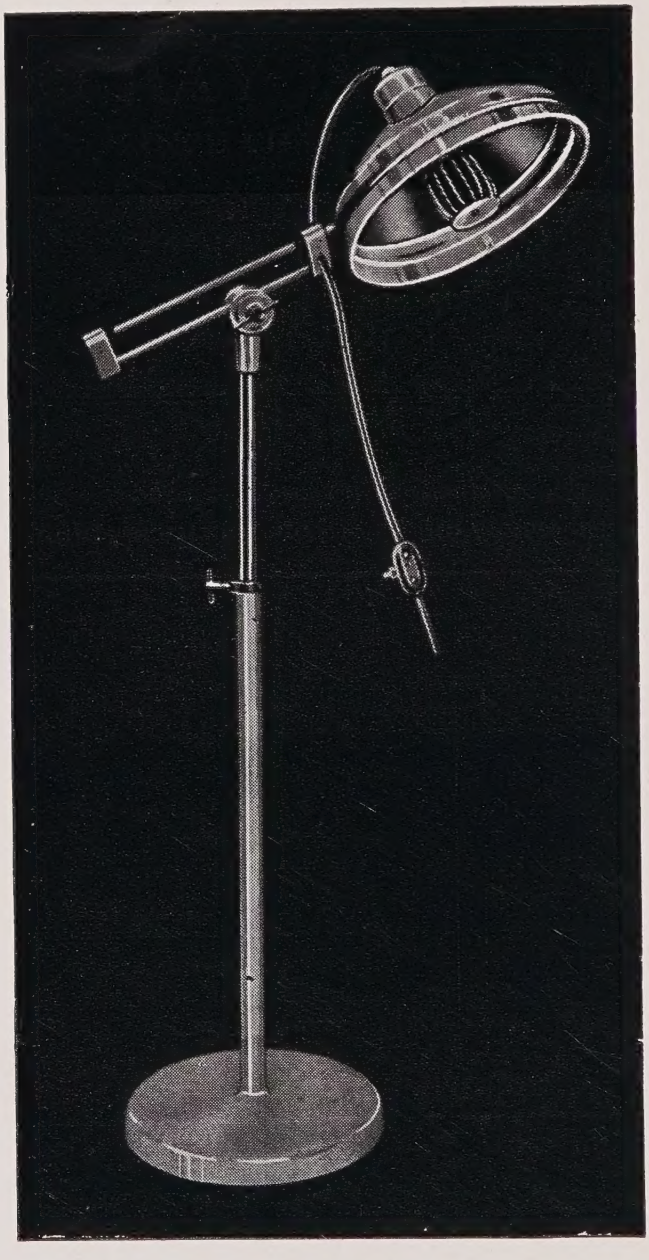
No.	COMPRISING	PRICE
500	"Readson" Duo-Ray Apparatus complete with Universal Stand, Black Body Infra-Red Ray Generator, Luminous Radiant Heat Bulb, Rubber-covered Connecting Cable, Plug or Lamp Socket Adaptor. The lamp is detachable from the stand and can be used as a hand lamp when required	**£5 5 0**

Please state Voltage of your electrical supply

For instructions for use, see page 20

SUPER
DUO-RAY APPARATUS

PRINCE CHARMING MODEL



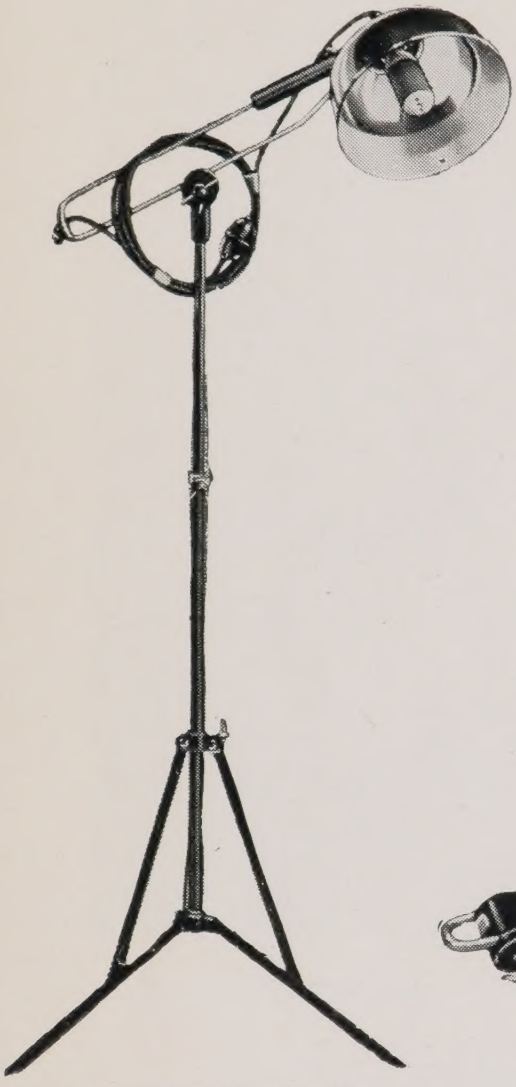
No.	COMPRISING	PRICE
647	"Readson" Super DUO-RAY apparatus complete, as illustrated and described, fitted with 12-in. Reflector, anodized finished. All other parts being cellulosed lacquered with nickel-plated fittings, Black Body, Infra-Red Ray Generator, and flame-Radiant Heat Bulb, rubber-covered Connecting Cord Plug or Lamp Socket Adaptor	**£6 7 0**

Please state Voltage of your electrical supply

For instructions for use, see page 20

DUO-RAY APPARATUS

FOLDING STAND MODEL FOR PORTABLE PURPOSES



List No. 648. Ready for use

Total Weight, 6 lb.

List No. 648.
Collapsed for carrying

No.	COMPRISING	PRICE
648	DUO-RAY Apparatus, folding stand pattern for the use of those who desire to move their apparatus from place to place. The weight of the entire instrument is only 6 lb. The apparatus comprises the folding telescopic stand, Black Body Infra-Red Ray Generator, Luminous Infra-Red Ray Radiation Bulb, rubber-covered Connecting Cable, Switch, and Plug or Lamp Socket Adaptor. The lamp is detachable from the stand and can be used as a hand lamp when required.	**£5 5 0**
649	Carrying Case for Lamp as seen above, if required	**£0 10 6**
651	Brown Canvas Satchel with carrying handle for stand if required	**£0 9 4**

Please state Voltage of your electrical supply

For instructions for use, see page 20

DUO-RAY APPARATUS

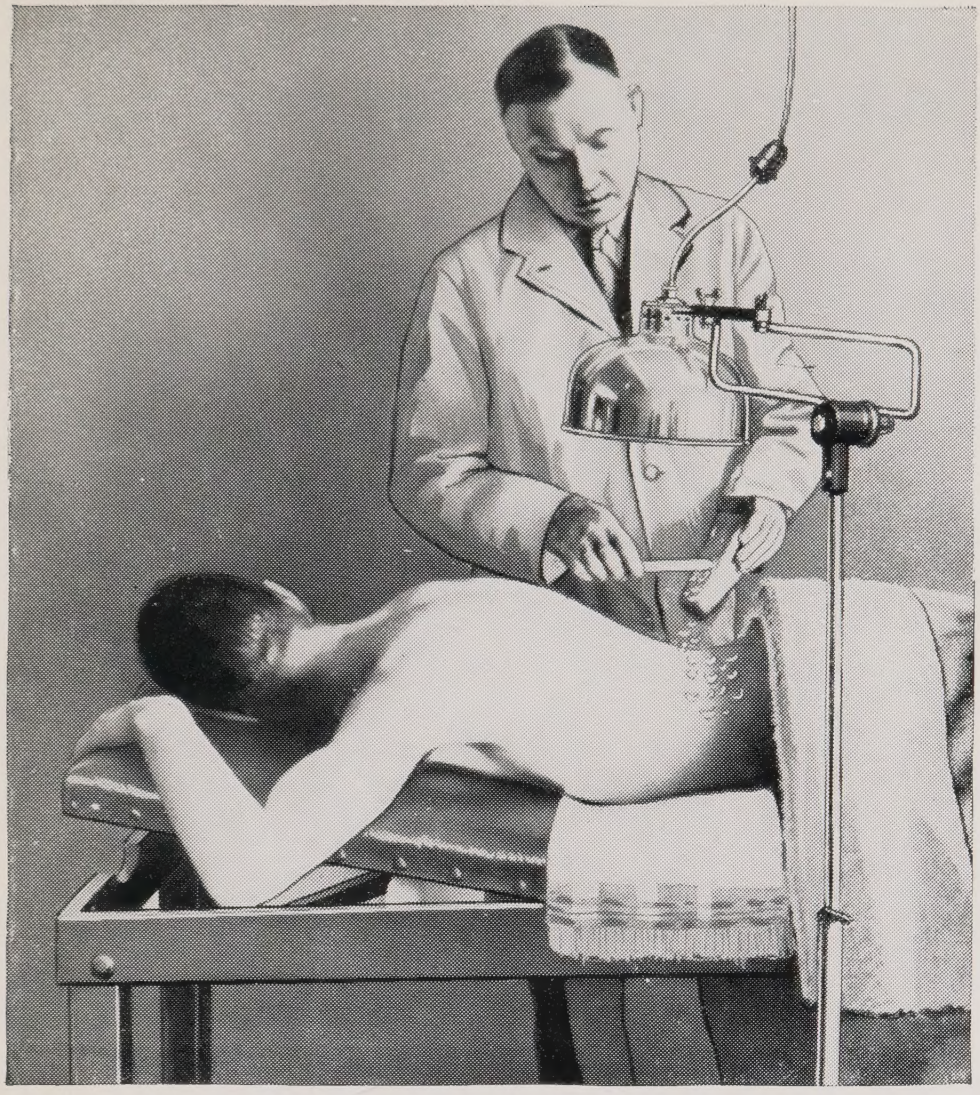
DOUBLE MODEL

As used in the London Hospital

No.	COMPRISING	PRICE
650	Double Duo-Ray Infra-Red Ray and Radiant Heat Apparatus. This apparatus is designed to give double intensity and to permit of two parts of a patient being simultaneously treated. It is recommended for busy Institutions and permits of a great saving in time in treatment. Either of the hoods can be used independently when required	**£9 7 0**

Please state Voltage of your electrical supply

For instructions for use, see page 20



Duo-Ray Apparatus in use for Melted Wax Bath Treatment

No.	COMPRISING	PRICE
510	Duo-Ray Medicated Wax for Melted Wax Bath Applications. Per Carton of two Blocks	**3s. 3d.**

INSTRUCTIONS FOR USE OF DUO-RAY INFRA-RED RAY LAMPS

Nos. 500 to 600

The radiation emitted by the DUO-RAY Apparatus is quite harmless, and no ill effects can possibly result.

The DUO-RAY Lamp is normally supplied with two elements (1) a Luminous Radiant Heat Bulb and (2) Infra-Red Ray Generator.

Luminous radiant heat can be supplied in those cases where it is desired to treat superficial conditions such as may be benefited by the hyperaemia that this radiation produces on the superficial layers of the skin. The period of application is from 10-40 minutes or as may be directed by the Physician.

The Infra-Red Ray Generator is used where it is desired to obtain a penetration of the deep-seated tissues. The effect of the Infra-Red rays is more penetrative than luminous radiations and is therefore preferred in rheumatic conditions, lumbago, neuritis, etc.

It is necessary for the apparatus to run up to its normal temperature before being applied to the patient for treatment, and a period of ten minutes should be allowed for the current to pass to heat up the generator before application is made to the patient.

The apparatus is then placed at a distance of 8 to 12 in. from the edge of the reflector and the patient's skin, the precise distance being regulated by the heat tolerance of the patient or as may be directed by the Physician ; the usual period of application is ten to forty minutes. The apparatus is fitted with a cord switch for the control of the current ; when the red knob on the switch is projecting the current is on, when the black knob is projecting the current is off.

The reflector should be kept as clean as possible to maintain its brilliant surface. A little dry whiting on a smooth duster will facilitate this. Where possible treatment of thirty to forty minutes' duration are advised. The radiations given by the DUO-RAY Apparatus are quite harmless and should not be confused with other types of radiation which can only be tolerated for a few minutes. There are no detrimental after-effects to guard the user against. The DUO-RAY Apparatus is quite safe.

Adjustment.—At the head of the vertical column will be seen a black Bakelite universal joint, and a nickel-plated lever screw for clamping. When the lever screw is slackened it will be observed that the universal joint allows the hood of the apparatus to be placed in any position in two planes at right angles to each other ; vertically an adjustment for height is obtained by means of the telescopic stand.

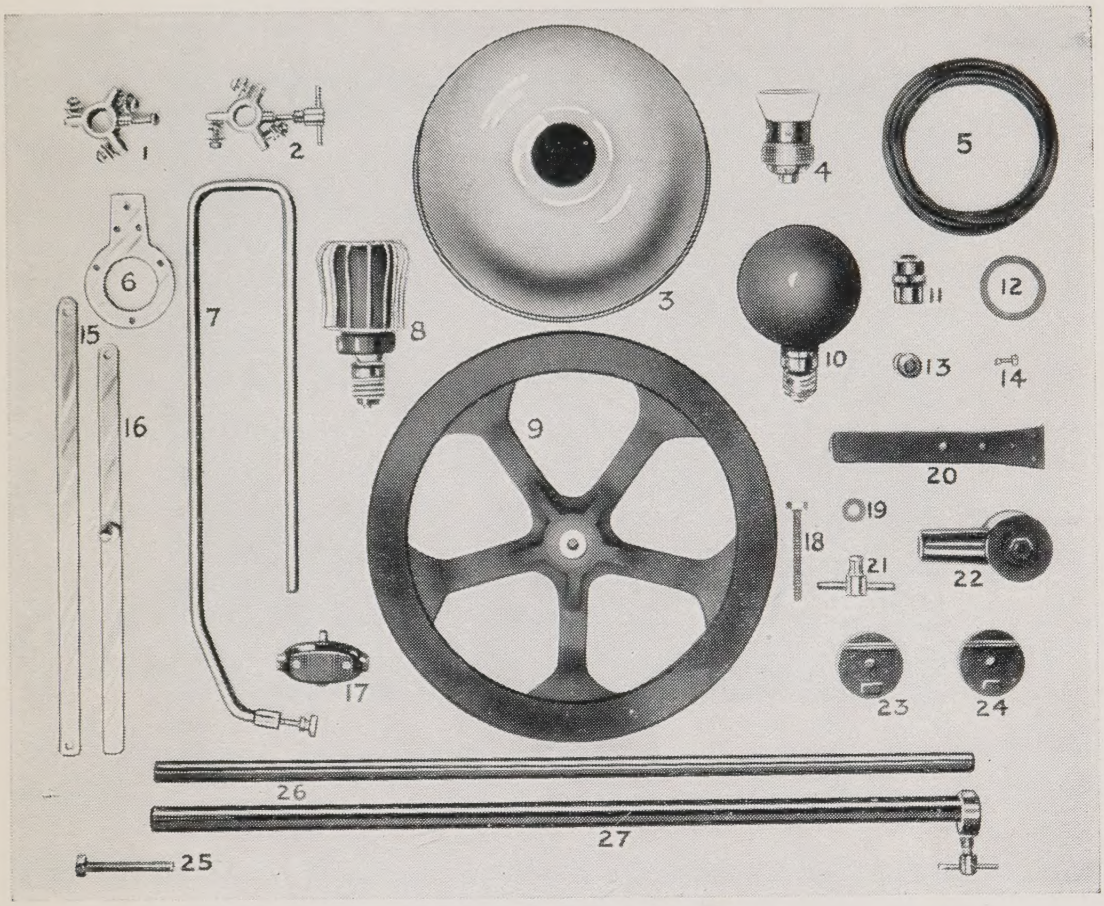
Massage with Infra-Red Radiation.—Frequently hand massage and Infra-Red radiations are administered simultaneously with excellent results and massage is undoubtedly a valuable adjunct to this treatment.

Voltage of Supply—The elements supplied with the apparatus are in accordance with the town supply voltage, but where it is desired other voltages can be applied to the apparatus providing that the voltage is no more than 10 per cent over or 10 per cent under the voltage stamped on the elements. Elements of any specified voltage, 100-250 volts, are immediately available from the manufacturers or their agents.

SPARE PARTS LIST

DUO-RAY APPARATUS

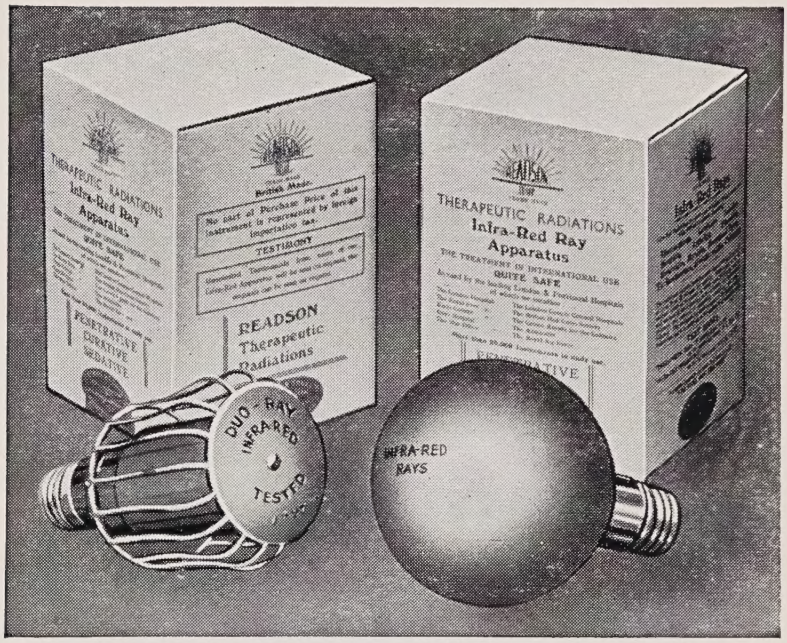
BEST BRITISH MAKE



No.		Price
1.	Three lug casting (fixed) for collapsible stand Duo-Ray apparatus No. 648	4/11
2.	Ditto, movable	6/–
3.	Polished aluminium dome reflector for Duo-Ray apparatus	7/2
4.	Screw type connecting holder	2/6
5.	Length of connecting cable, 9 feet	3/3
6.	Aluminium casting to unite holder No. 4 to handle No. 20	5/3
7.	Aluminium cross arm complete with fixing screw	4/8
8.	Black body infra-red ray generator	13/9
9.	Base casting for Duo-Ray standard apparatus No. 500	12/–
10.	Luminous infra-red radiation element	11/–
11.	Bakelite plug adaptor for use in electric light socket	1/1
12.	Ferodo washer to go between surfaces of Bakelite turntable joint Nos. 22 and 23	7d.
13.	Threaded insulating bush to attach to holder No. 4	7d.
14.	Small plated bolt and nut for attaching same No. 3 to casting No. 6 also for fixing No. 6 to handle No. 20	3d.
15.	Aluminium stay bar for collapsible stand No. 648	2/9
16.	Aluminium foot support for collapsible stand No. 648	2/9
17.	Cord switch for control of current	2/2
18.	Plated bolt for centre of turntable fitting No. 20	11d.
19.	Plated washer for above	5d.
20.	Bakelite handle	3/9
21.	Female Tommy screw for bolt No. 18	1/4
22.	Bakelite turntable joint	4/4
23. 24.	Bakelite clamping surfaces each	1/8
25.	Fixing bolt to attach No. 27 to No. 9	9d.
26.	Plated steel tube for vertical column of apparatus Nos. 500, 648, 647	3/9
27.	Cellulosed steel tube for vertical column of apparatus Nos. 500, 648, and 647	3/9
28.	Spring washers not illustrated each	4d.

DUO-RAY APPARATUS

RADIATION ELEMENTS



Note.—The Duo-Ray Elements are available for every make of apparatus, and are recommended for the best results.

No.	COMPRISING	PRICE
508	DUO-RAY, Black Body, pure Infra-Red Ray Generator fitted with safety guard, Edison screw cap. Best quality	**13s. 9d.**
506	Luminous Infra-Red Ray Radiation Element, fitted with Edison screw cap. Best quality	**11s.**

Please state Voltage of your electrical supply

THE DUO-RAY APPARATUS

is normally supplied with two elements, viz.: the Black Body Infra-Red Ray Generator, and the Luminous Radiation Lamp. It should be noted that the Black Body Infra-Red Ray Generator and the Luminous Radiation Lamp are both sources of Infra-Red Rays but in the former instrument the radiation is practically pure Infra-Red rays and in the latter, the radiation is made up of 75 per cent Infra-Red Rays, 2 per cent Ultra-Violet light, and 23 per cent visible light rays.

For the information of our clients we recommend that these be applied as follows:

RHEUMATIC CONDITIONS

Rheumatoid Arthritis	Black Body Infra-Red Ray Generator
Osteo-Arthritis	Black Body Infra-Red Ray Generator
Fibrositis and Myositis, including **Stiff Neck,** **"Backache"**	Alternate treatments: Black Body Infra-Red Ray Generator with Luminous Radiation Lamp
Lumbago	Black Body Infra-Red Ray Generator
Neuritis, Sciatica ,, **Brachial** ,, **Facial** **Facial Paralysis** **Tic Doloureux** **Herpes** **Toothache** **Neuralgia**	50 per cent of the time of each treatment with Black Body Infra-Red Ray Generator and 50 per cent with Luminous Radiation Lamp, using always first the Black Body Infra-Red Ray Generator
Chilblains **Reynauds Disease**	Black Body Infra-Red Ray Generator
Chronic Bronchial Catarrh **Sinusitis** **Common Cold**	Alternate treatments with Black Body Infra-Red Ray Generator and Luminous Radiation Lamp
Varicose Ulcer	Two treatments by Luminous Radiation Lamp followed by one treatment from Infra-Red Ray Generator

Acne	Luminous Radiation Lamp
Indolent Ulcers	Black Body Infra-Red Ray Generator
Tubercular Abscess	Luminous Radiation Lamp
Anterior Poliomyelitis	Luminous Radiation Lamp
Relief of Pain	No general rule can be applied. It is as well in all cases to try each element to ascertain which provides the greatest measure of satisfaction, obviously the cause of the pain will have some bearing on this point
Lupus (Skin Tuberculosis)	Luminous Radiation Lamp
Painful Menstruation	Black Body Infra-Red Ray Generator
Boils **Abscesses** **Whitlows**	Black Body Infra-Red Ray Generator
Bronchitis **Pleurisy** **Later Stages of Influenza**	Luminous Radiation Lamp

INFLAMMATORY CONDITIONS such as :

Onychia **Boils** **Ulcers** **Carbuncles** **Strains** **Sprains** **Bruises** **Long Standing Insurges**	Black Body Infra-Red Ray Generator
Conjunctivitis	Black Body Infra-Red Ray Generator

PACKING CHARGES

Where the apparatus selected has to be sent by rail or post the following additional charges are made.

List No.		
502 503 504 501 505 507	An extra charge for **packing and postage** of ..	2/6
512 514 516	An extra charge for packing only .. .. .. (Rail charges are paid forward by consignee)	3/–
500 647	An extra charge for packing only .. .. .. (Rail charges are paid forward by consignee)	4/–
648	An extra charge for **packing and postage** of ..	4/6
650	An extra charge for packing only	5/–

HARRODS, LTD.

Surgical and Electro-Medical Department

LONDON, S.W. 1

THE CAMPFIELD PRESS, ST. ALBANS